

## CLAIMS

We claim:

1. An omni-directional image and 3-Dimensional data acquisition apparatus, comprising:

a multi-camera module constructed in a manner that a plurality of cameras are symmetrically arranged with a specific point in a plane, each of the cameras taking charge of each of divided angles such that the camera module can take an omni-directional continuous panoramic photograph of surrounding objects with the specific point;

first frame grabbers each of which is electrically connected to each of the cameras of the multi-camera module, to grab photographed images by frames;

an exposure calculator electrically connected to the first frame grabbers, to calculate exposure of each camera, based on the grabbed images by frames;

an exposure signal generator electrically connected to each camera, to transmit information about the exposure as a signal on the basis of the exposure calculated by the exposure calculator;

storage means electrically connected to the each first frame grabber, to store images photographed by the cameras according to photographing location and photographing time;

a GPS sensor to sense the photographing location and photographing time;

an annotation entering unit electrically connected to the GPS sensor to calculate location and time corresponding to each frame based on sensed data of the GPS sensor, the annotation entering unit being electrically connected to the storage means to enter the calculated location and time in each frame as annotation; and

a trigger signal generator electrically connected the storage means, the exposure signal generator, the annotation entering unit, the trigger signal generator selectively transmits a trigger signal

to the exposure signal generator or the annotation entering unit in order that the cameras start to photograph the objects according to the trigger signal; and

wherein the multi-camera module are vertically stacked and formed in at least two layers in the direction of height.

2. The apparatus as claimed in claim 1, further comprising a plurality of light intensity sensors electrically connected to the exposure calculator to allow the exposure calculator to be able to calculate the exposure amount of the each camera based on external light intensity.

3. The apparatus as claimed in claim 1, wherein the storage means is one of digital storage devices including a hard disk, compact disk, magnetic tape and memory.

4. The apparatus as claimed in claim 1, further comprising an audio digital converter electrically connected to the storage means, the audio digital converter converting an audio signal sensed by an audio sensor into a digital signal as an audio clip to correspondingly attach to each image or image group to be stored in the storage means.

5. The apparatus as claimed in claim 1, further comprising a video camera electrically connected to the storage means via a second frame grabber for grabbing photographed moving pictures by frames, to the storage means a unique video clip corresponding to each image or image group to be stored in the storage means.

6. The apparatus as claimed in claim 1, wherein the multi-camera module further has at least one camera placed at the top thereof so that the camera can photograph an object upward.

7. The apparatus as claimed in claim 1, further comprising mobile means, on which the multi-camera module is mounted, to enable continuous panoramic photographing of the camera module while moving.

8. The apparatus as claimed in claim 1, further comprising a distance sensor and a direction sensor for respectively sensing the distance and direction of the image photographed by each camera;

9. A method for acquiring 3-dimensional data, comprising the steps of:

acquiring for multi images of an object in the direction of height photographed by the cameras, the multi camera module including a plurality of cameras which are symmetrically arranged at a specific point in a plane, and which take charge of each allocating viewing angle calculated by  $360^\circ$  divided by the number of the cameras;

searching for corresponding points in each image;

extracting for distance information using trigonometry; and

acquiring for 3-dimensional image data based on the distance information.

10. A method for extending dynamic range of images, comprising the steps of:

acquiring for multi images of an object, the multi images are photographed by the cameras which have different exposure amount each other, wherein the multi camera module including a plurality of cameras which are symmetrically arranged at a specific point in a plane, and which take charge of each allocating viewing angle calculated by  $360^\circ$  divided by the number of the cameras;

selectively extracting for regions in the multi images, wherein the regions have constant exposure amount; and

acquiring for images of dynamic range extension, which are generated by composing the extracting regions.

11. An omni-directional image and 3-Dimensional data acquisition apparatus, comprising:

a multi-camera module constructed in a manner that a plurality of cameras are symmetrically arranged with a specific point in a plane, each of the cameras taking charge of each of divided angles such that the camera module can take an omni-directional continuous panoramic photograph of surrounding objects with the specific point;

an elevator for elevating the multi-camera module vertically;

first frame grabbers each of which is electrically connected to each of the cameras of the multi-camera module, to grab photographed images by frames;

an exposure calculator electrically connected to the first frame grabbers, to calculate exposure of each camera, based on the grabbed images by frames;

an exposure signal generator electrically connected to each camera, to transmit information about the exposure as a signal on the basis of the exposure calculated by the exposure calculator;

storage means electrically connected to the each first frame grabber, to store images photographed by the cameras according to photographing location and photographing time;  
a GPS sensor to sense the photographing location and photographing time;

an annotation entering unit electrically connected to the GPS sensor to calculate location and time corresponding to each frame based on sensed data of the GPS sensor, the annotation entering unit being electrically connected to the storage means to enter the calculated location and time in each frame as annotation; and

a trigger signal generator electrically connected the storage means, the exposure signal generator, the annotation entering unit, the trigger signal generator selectively transmits a trigger signal to the exposure signal generator or the annotation entering unit in order that the cameras start to photograph the objects according to the trigger signal.